RTC-TH Mar 2012 Update

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Community-based environmental education for the self-sufficiency and sustainability of small rural family farms

ชุมชนตามสิ่งแวดล้อมศึกษาเพื่อการพึ่งตัวเองและยั่งยืนชนบทขนาดเล็กครอบครัวฟาร์ม

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The RTC-TH F.U.N.D.S. Approach

Poverty in Thailand seems to be different from poverty in industrialized western countries. Here, even poor people have their own home. But that may change as more and more rural Thai farmers have access to "easy" credit. Don't forget, easy credit is blamed for much of the economic woes of the US and EU countries. At this time, Thailand does not have an extensive welfare system.

In the past, poor farm families relied on a social network of their extended families in times of need. No system is perfect. Some families cooperated better than others. People saved up for major purchases. If you couldn't afford something, you did without.

Any time you take out a loan it is a warning sign: You are spending more money than you have. In most cases, the collateral for loan is the land certificate for the family home or the farm. (Most Thais live in a village and not on their actual farm land.) Of course, failure to repay the loan runs the risk of foreclosure. If unable to qualify for a bank loan, private lenders can be contacted. The interest rates are, of course, usurious.

In the US this house is "substandard" but it is a house.

This is a more luxurious private home in the area.

A rural housing can range from the bare minimum to very luxurious depend on what a family can afford. It may seem contradictory that in a Buddhist country there are so many seeking to acquire such large quantities of material wealth. It is part of the human condition to want more.

In This Issue

It is easy to picture the likely cycle of debt. Inability to repay one debt often means additional borrowing to meet the deadline for the first loan payment. If the land certificate for the home was used for the original debt, another (perhaps for the farm land) is used to secure the second debt. In some cases, the original land certificate is ready to be "recycled" to a second loan once it is retrieved from the first one.

Many people spend to improve their homes.

The lack of debt is the best way of retaining freedom of choice. This is why the RTC-TH advocates F.U.N.D.S. (Farming Under a No Debt System).

For some this an unrealistic ideal. But in reality, it's like starting a small business. Undercapitalization is the key reason 99% of all new small businesses fail in the first year. A simple way to avoid this problem is never to spend more money than you have. By using this simple rule, you avoid amassing debt in the first place.

It's hard to tell how encumbered the land maybe

For most rural families, the reality is they already in debt. So the first obvious step is to get out of debt. This takes much self-discipline. Unfortunately, that is often in short supply for many. It is critical to differentiate between "needs" and "wants". Focus on the necessities for health, nutrition, and maintaining your ability to work. You have more control of the money you have in your hand. You have very little control over how much money others will put in your hand. The immediate goals are cost cutting and diligent saving. Your must learn to make do with what you have. Sacrifice and doing without are the harsh realities of life once you spend more than you have.

Budgeting starts with pencil and paper. It is very important to write it down so you can SEE it.

Implementing the King's Theory and striving for self-sufficiency is like a small business aiming to break-even before making a profit. The break-even point is a logical and sequential step in the process. You cannot make a profit without first reaching the break-even point. So there is no harm in setting this as your first goal.

Budgeting is a never ending process. It starts with writing down all expenses, debts, and income. Start with broad categories before getting all the details. Time is a factor. Some expenses occur daily, weekly, monthly, or annually. If you don't write it down; you won't see or know where all the money is going. Any payments that are made annually should be divided by 11. The result is the amount

that must be put aside each month. Then by the start of the 12th month, you have the full annual payment ready.

Once you see your budget, start to find ways to cut expenses. There are ways to economize on food without eroding your health. Be careful NOT to put your health at risk. If you get sick, you won't be able to work. Rather than "robbing Peter to pay Paul" you must learn to effectively manage your cash flow.

For example, gardening provides a family with food and reduces costs. Surpluses can be sold to earn income. Grow what you eat, eat what you grow. To see the finances involved, save the money you don't spend for vegetables. If you grow carrots, take the money you would have spent for carrots at the market and put that money into a jar or a savings account. This is how you really SAVE the money. Most people leave the money in their pocket and tend to spend it on something else. Then they claim you can't save anything by growing your own vegetables.

Gardening feeds the family to reduce expenses.

A plastic bottle and water gives free light in a house.

Conserve water and electricity consumption. Using natural lighting via "solar lighting" (see photo on left) reduces your electric bill. But you only SAVE money by actually putting the difference of the lower electric bill into a savings account.

Do the same thing when buying anything at a discount. Take the difference between the higher and lower price and put it into a jar or bank. If you leave the money in your pocket and don't SAVE it, you end up spending it.

Using your surpluses for barter reduces your expenditures and helps keep cash in your hands. Selling your surpluses brings in cash. The amounts will not make you a millionaire overnight. Adding value to your goods can increase your income. Of course, any Income should be saved and used to reduce debts.

In Summer 2008, we presented an example of value added using pork. Many famers raise pigs to sell piglets or to slaughter and sell for meat. Making pork sausage adds value. Consider what you pay to buy a kilo of raw pork vs. a kilo of raw sausage. More value is

The value per kilo changes from live pig, to raw pork, to raw sausage, to cooked sausage in a meal.

added when the sausage is prepared and served as part of a meal in a restaurant. An entrepreneurial farm family can increase their earnings if they can participate at different levels of economic activity going from the farm to the table.

Team up with relative's who run a restaurant

We tend to grow what we eat and eat what we grow. Our surplus is bartered or sold. In this case, the selling is done via a relative's restaurant, so the income earned is partly for our family, and partly for a relative. This is based on mutual respect for the role each plays in the activity, and mutual respect for the resources each brings to the system. The sausage makers earn some income for to the value they added to the raw pork. The relatives with the restaurant earn by the value they add to the sausage meal they serve. If there is sufficient demand, additional sausage can be made to order. A key difference in the RTC-TH model is the sausage is primarily made for family consumption. Additional sausage is made only when it is sold by pre-order. In other words, don't make sausage HOPING to sell it; make sausage for your own consumption or make it because it's sold in advance. [**Note:** We are discussing this plan in more detail with some relatives and have yet to implement it.]

Get back the land certificate: without it you have no farm or no home

Money saved should first be used to pay off loans. Getting out of debt is the top priority. Most people tend to spend money faster than they make it. When money is saved there is a tendency to want to spend it NOW. People say they have every intention to replace it. But the pressure to spend seems stronger. There is that old saying: "The road to Hell is paved with good intentions." In the RTC-TH, that is not the road we want to travel.

When getting out of debt, think "go slow and grow" rather than "get rich quick." If you are already in debt, starting a business with the hope of making it big is not a good choice. Remember, 99% of all new businesses started in a year will fail due to under capitalization and / lack of effective management skills. So if you are already in debt, you are stacking the deck against yourself. First, you obviously lack capital. Second, getting into debt could be a good indicator you lacked effective management skills. So why stack the deck against yourself? Why set yourself up for failure?

In most cases, the true path to freedom is to get out of debt as soon as you can. Once out of debt, avoid incurring debt in the future. Getting more income is not easy. A popular saying is "you need to spend money to make money." This only works if you have money you can afford to and are willing to put it at risk. Whatever money you have in your pocket, others want to get it into their pocket. You need to keep control of your money.

Hot-Dry Season = Smoke & Haze Season

The reasons for using fire to clear the land and prepare fields are numerous and varied. To be sure, it is one of the cheapest ways to clear brush and get rid of crop residues in the field. Habits are hard to change. We have hired day workers who fail to follow instructions and use burning on our farm. [**Note:** Sometimes we use fire in a burn barrel to deal with thorny weeds.]

Brush clearing by fire in the hills of Thailand.

Northern Thailand gets hazy and smoky from Jan-Apr each year. Air quality standards for PM10 (aerosol particles 10 Microns in diameter) in Thailand is 120 / µgm (micrograms) / cm^3 of air as opposed to 50 µgm / cm^3 in many industrial countries. During the burning season, parts of northern Thailand can see PM10 index values of 120 to 200 µgm / cm^3 more. In Feb 2012 news reports showed these values:

AQI.	Meaning	Color	Guidelines for impact protection.
0-50	Quality.	Blue.	No health impacts.
51-100	Medium quality.	Green	No health impacts.
101-200	The health effects.	Yellow.	Patients with respiratory disease. Avoid outdoor exercise. Guests, especially children and the elderly. Avoid prolonged outdoor activities.
201-300	Have an impact on health.	Orange	Patients with respiratory disease. Avoid outdoor activity. Guests, especially children and the elderly. Should limit outdoor activity.
More than 300	Danger	Red	People should avoid outdoor exercise. For patients with respiratory disease. Should be placed inside the building.

The Thai Air Quality Index (AQI).

Province	AQI PM10
Phayao	237.46
Phrae	233.17
Lampang	173.21 - 210.21
Nan	151.71
Chiang Rai	151.67
Lamphun	180.42
Chiang Mai	176.54

On 27 Feb 2012, the air quality over northern Thailand was so bad one provincial airport delayed and cancelled flights and closed temporarily due to poor visibility. Highway warnings were posted advising drivers to slow down due to poor visibility. People with respiratory health issues had to take precautions. Hospitals reported more patient visits but did not specify smoke or poor air quality as the cause. The government issued face masks in some areas.

Smoke / haze reduced visibility on the highways.

Lampang airport had to delay and cancel flights.

Authorities have been directed to more strictly enforce regulations curtailing burning. Under the Public Health Act, violators face a fine of 2,000 THB / $82.60 USD (about 1/3 of a month's pay for a common worker) for starting fires "that cause a public nuisance." Artificial rain making is being considered to help clear the air. [**Note:** No official announcements about this were issued as we went to press.]

The series of photos on the right shows the local haze behind our town property in Thawangpha City on 28 Feb 2012. The local high school in the photos is about 0.65 km from us. Each photo has the time it was taken, and the visibility reported by the Royal Thai Meteorological Department office in town. [**Note:** The rolling hills ~3 km in the background are barely discernible in the last photo (see red arrow).]


0700 hrs; 3 km visibility


1000 hrs; 3 km visibility


1300 hrs; 4 km visibility


1600 hrs; 5 km visibility


Spring 2007: Fire from the west jumped our fire break…


…and started spot fires in our orchard

Another major objection we have to burning is the threat of fire encroaching on our farm. This has happened in the past when fire from the land on our west boundary spread to our farm. The conditions that accelerate the spread of fire from that direction are a combination of topography (the neighboring land slopes UP toward ours) and the wind from the west. These make it easier to loft embers onto our land.

Making fire breaks along our west boundary and preparing to fight a spot fire appearing on our farm are less effective because of the topography and wind. Fire prevention by educating others of the benefits of not burning is another approach.

Another concern about burning crop residues and clearing fields or planting is the lost of natural soil nutrient materials. Burning literally sends these up in smoke. Ironically, farmers will then spend money to buy inorganic synthetic chemical fertilizers to boost soil nutrients. The summary table below shows what is lost when burning rice straw, and which of the elements are sought in commercial inorganic (synthetic) fertilizers.

Element	Lost in Burning	Commercial fertilizer
Carbon	40%	---
Nitrogen (N)	93%	X
Phosphorus (P)	25%	X
Potassium (K)	21%	X

A major reason farmers give for buying synthetic fertilizers is the promise of increase production. From a sustainable point of view, the real issue is forcing the land to produce 2 and 3 crops per year and depleting the soil

over the long term. In many cases, it is marginal to try to get a second crop, and extremely marginal to get a third.

Most inorganic fertilizers are made using the key macro nutrients nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulfur (S). All plants require 3 other macronutrients: carbon, hydrogen, and oxygen which they get from water and carbon dioxide. Some fertilizers include the micronutrients: boron (B), chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo) and zinc (Zn).

Our key objections to the use of inorganic synthetic fertilizers are:

- They utilize fossil fuels as a key input in their manufacture;
- Synthetic inorganic chemicals persist and don't readily breakdown in the environment. They constitute a major pollution threat and are counter to the goals of natural balance and sustainability.
- Their high cost for small rural family farms contributes to indebtedness. [**Note:** As fuel prices go up, most other goods increase in price. The RTC-TH advocates small rural family farms should reduce off-farm expenses to save money.]
- There is concern these chemicals contribute to the depletion of micronutrients and trace elements in the soil. This does not bode well for long term sustainable agriculture.


We leave our rice straw as mulch in the paddy.

It has been clearly demonstrated that composting residual rice straw in place can be easily done 1 month prior to rice planting. At the same time, planting a green manure, apply animal manure and EM (Effective microorganisms) is an effective way to improve rice paddy soil and boost harvest yields. We have done this to get 40-50% more rice on our farm.

We only plant one rice crop per year and do not plant dry season crops in our paddies. Instead the paddies are left fallow except for the green manure planted 1 month prior to the next rice season. The green manure is plowed under to build the organic content of the soil. Remember, we are striving to practice sustainable agriculture and are not growing rice for commercial sale. [**Note:** The current Thai government program to buy rice directly from farmers at above market prices does NOT apply to rice grown for family consumption. So subsistence family farms cannot get high earnings by selling their rice. Some people mistakenly thought they could take advantage of the high earnings, and then buy rice for their consumption at more normal prices in the local markets.]

Old habits die hard. People get caught up in cultural inertia and seem unable or unwilling to change their ways. This is one reason the RTC-TH initiated REEEPP (the Rural Environmental Education Enhancement Pilot Program) to create learning opportunities for elementary school students to learn about sustainable agricultural practices.

Soil Temperature & Moisture in Sunlight & Shade

It's the hot, dry season in Thailand. Burning to put smoke and haze into the atmosphere does reduce the intensity of sunlight. But we think the loss of nutrients is too high a price to pay. We prefer to recycle the nutrients back to our farm. So our strategies for the hot-dry season are:

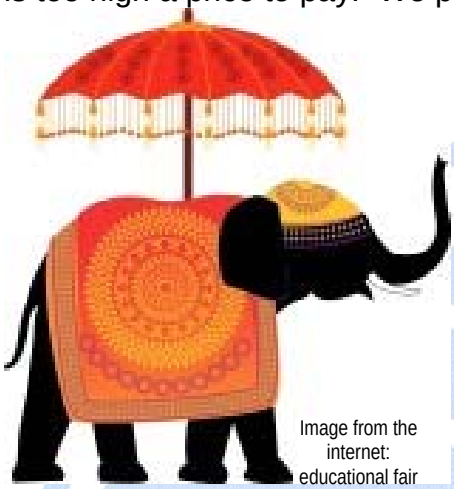


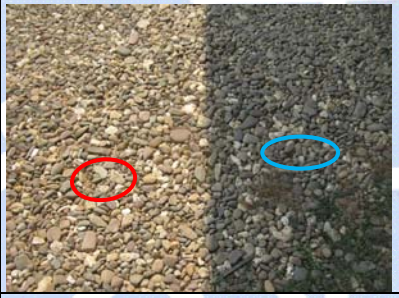
Image from the internet: educational fair

- **Mulching** to shade the soil reduces evaporative soil moisture losses.
- **Drip irrigation** should be applied to the root zone (not dripping water on the soil surface near the plant).

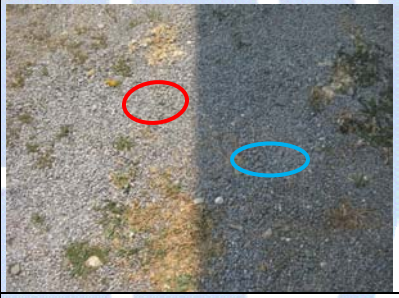
Everyone knows there is a difference in the temperature between standing in the sun or in the shade. But few people can tell you how much of a temperature difference. We thought it would be interesting to measure the temperature of different surfaces in sunlight and shade. This can show the importance of mulch to shade the soil, reduce evaporation and conserve soil moisture. We measured the temperatures of the following surfaces and took the photos below. We did this on a clear sky, sunlit day in the mid-afternoon (~1500 hrs) when temperatures are usually at their highest.

Concrete sidewalk
38.1°C 30.7°C

Coarse Gravel
37.8°C 36.4°C



Fine Gravel
41.1°C 35.8°C



Garden soil
50.8°C 34.1°C

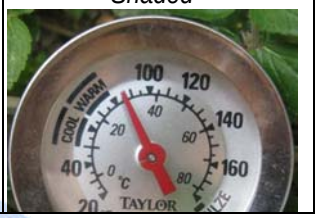
Garden ground cover
31.1°C 28.7°C

Grass
38.1°C 28.8 °C

In the photos above, the colored circles show the measurement areas: red = in the sun light; blue = in the shade. The pattern is obvious, but the actual temperature measurements tell us the number of degrees difference.

Of all the samples, the garden soil and garden ground cover were of the most interest to us. Ground cover, like mulch, shades the soil surface and keeps it cooler. A ground cover plant needs water to live and thus provide the cover for the soil. Mulch has the advantage of not requiring water to work. Also, mulch can be made from plant materials that are often considered waste. Think of mulch as long-term composting in place. The mulch eventually breaks down and becomes compost.

We took soil temperatures at a depth of 10 cm / 4 in (~shallow root zone). The results are shown below. The shaded garden ground cover comes out the winner. Less heat means less soil moisture will lost by evaporation.

Garden soil subsurface temperature		*Garden ground cover subsurface temperature*	
Sunlit	*Shaded*	*Sunlit*	*Shaded*
			

We then used a soil moisture meter to compare / contrast the garden soil and garden ground cover sample areas. The sensor probe was inserted about 10 cm / 4 into the soil (the same as the temperature measurements). The results are shown below. The soil with the ground cover had the most moisture.

Garden soil subsurface moisture		*Garden ground cover subsurface moisture*	
Sunlit	*Shaded*	*Sunlit*	*Shaded*
			

[**Technical Note:** The basic equipment we use for these field studies is small, compact, and easily carried in a back pack or field kit. Because soil can vary a great deal over a short distance, good sampling is essential to get meaningful results. This means looking at the variety of conditions such as slope angle, slope aspect, relative height (e.g. high and low spots), shaded / sunlit, as well as soil types, soil compaction, etc. You should also get at least 3 measurements for at each sampling spot, then average the results. You can learn more about soil sampling by visiting http://www.neighborhoodlink.com/RTC-TH_Tech/pages and reading RTC-TH paper AG 2006-1 Basic Recon Soil Survey Methods.]

The basic test equipment used: Infrared Thermometer, Soil Thermometer, Soil Moisture Meter

Admittedly the equipment we use is not professional laboratory grade. We don't pretend to be getting highly accurate quantitative data. The relative data we get is enough to show the general situation. These general data lets us track changes over time and detect trends in the soil conditions on the farm.

Tropical soils are characterized by having low organic content. Rather than burn the straw, we leave it in place, add some water and allow it to decompose. Our paddies are fallow for the dry season. One month before the next wet season planting, we grow a green manure to fix nitrogen in the soil. When the green manure matures, we add EM bacteria, compost, and manure to the paddies and plow it all under. The added organics boost the soil condition. Using this procedure our paddy rice yield has increased by 40-50% annually without the use of synthetic inorganic fertilizers. We want to recycle our residual plant nutrients into the soil and not let them go up in smoke.

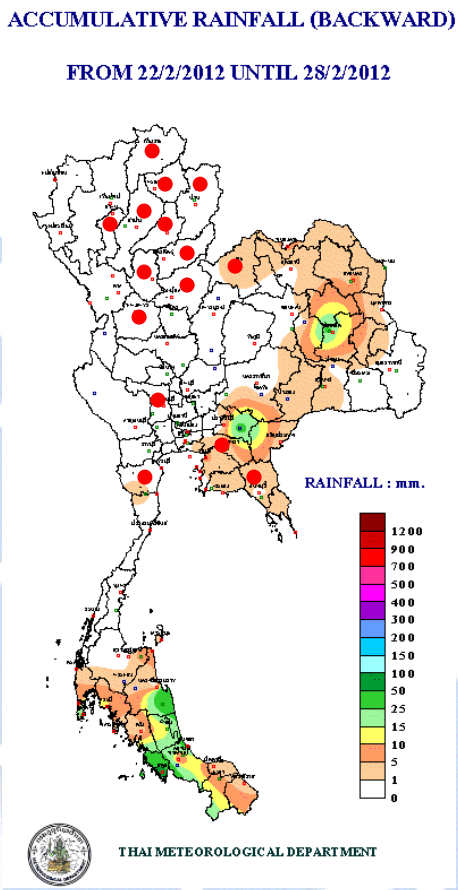
Thai Flood-Drought Pendulum

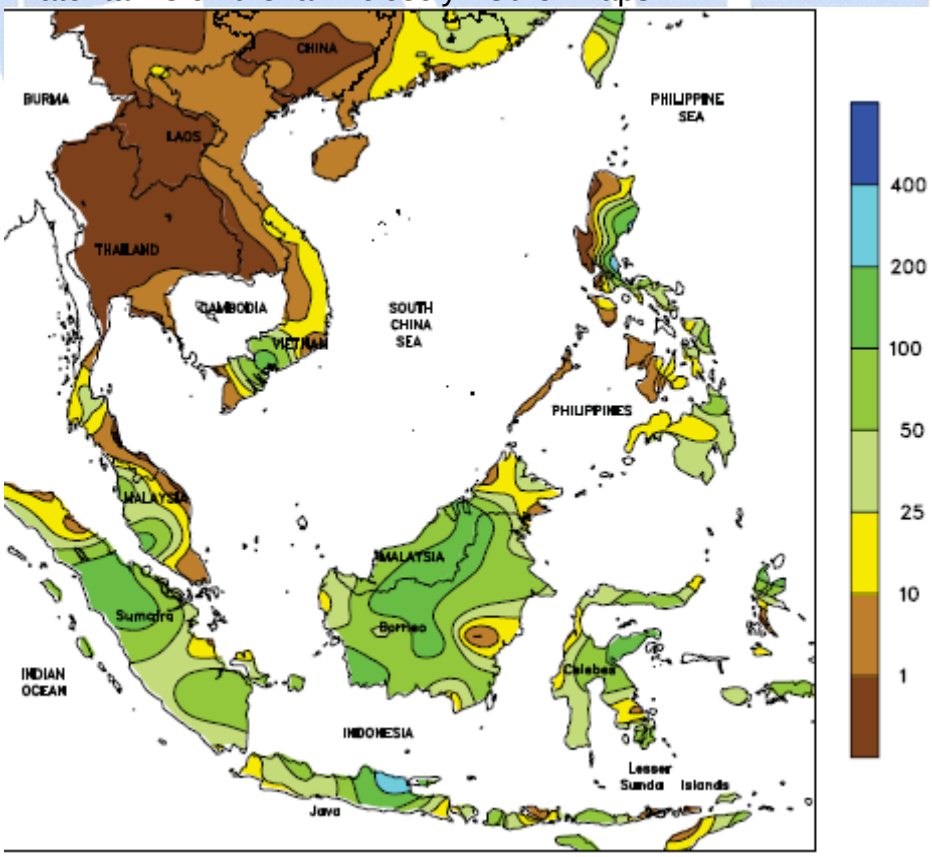
While most of Thailand is struggling to recover from the floods, reports are emerging that deepening drought in Thailand has spread to 15 of the country's 77 provinces (see red dots on map to the right):

- Ten of the drought stricken provinces are in the north: Chiang Rai, Kampaeng Phet, Lampang, Lamphun, Nan, Phayao, Phitsanulok, Phrae, Sukhothai and Uttaradit.
- The other 5 province are Chanthaburi and Chachoengsao (east), Loei (northeast), Phetchaburi and Suphan Buri (central Thailand).

Locally, in Thawangpha, shallow water wells among our neighbors near the junction of highways 1080 / 1148 have gone dry over the past few days. Everyone has had to switch to the more expensive Thawangpha Municipal water supply. Typically Mar-Apr are the really hot months. It is an serious concern that the wells have gone dry before the hot season has really struck.

We will be monitoring our fish ponds and water tanks on the farm closely. Other maps

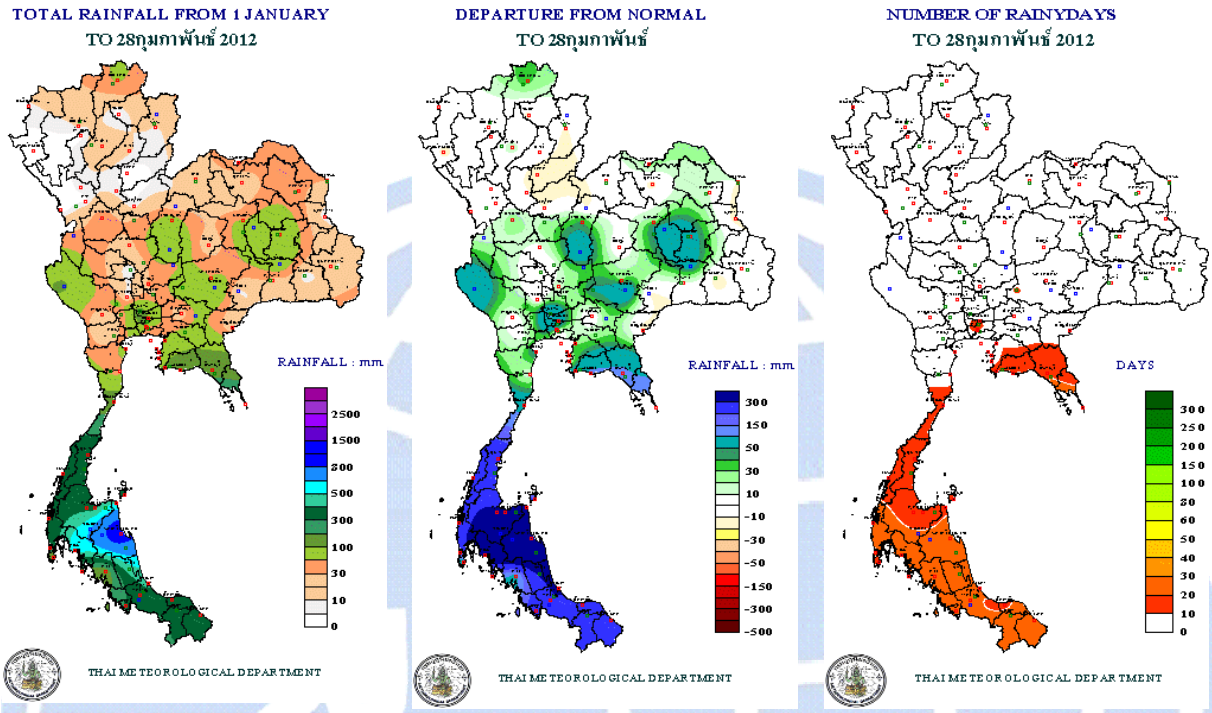




Total precipitation (mm) map for Southeast Asia, 19-25 Feb 2012 showing most of Thailand experiencing dry conditions. Ironically, the southern tip of peninsular Thailand has some areas still recovering from the flooding of the NE monsoons of late Jan – early Feb.

This map was generated by the Climate Prediction Center of NOAA. It is from the Internet and included in this article under the education free use clause.

From the Thai Meteorological Department show the rainfall from 01 Jan 2012 to 28 Feb 2012. The map on the left shows total rainfall for the period. Our part of Nan got about 20 mm of rain. This is about 10 mm below normal. During that first 2 months of 2012 we received no significantly measureable rainfall.



While most people associate drought with an absence or lack of water, climatologists tend to recognize 4 types of drought. [Note: Science often involves measurement. When you see the different types of drought, you get a sense for the different types of measurements used for each.]

Drought Type	Definition	
Meteorological Drought	Dry weather patterns dominate an area. This can have a fast start or fast end.	These types of droughts have tangible quantitative parameters in the natural world which are directly measured in the field.
Hydrological Drought	Low water supply becomes evident especially in streams, reservoirs, and groundwater levels, usually after many months of meteorological drought. This kind of drought takes a long time to develop and to recover.	
Agricultural Drought	Crops become affected by the lack of water. The impact is on the order of a crop cycle (on the short end) and could last several years (on the long end).	
Socio-economic Drought	This relates the supply and demand of various commodities due to meteorological, hydrological, and/or agricultural drought conditions.	This involves both quantitative and qualitative parameters some of which involve intangibles that are difficult to assess.

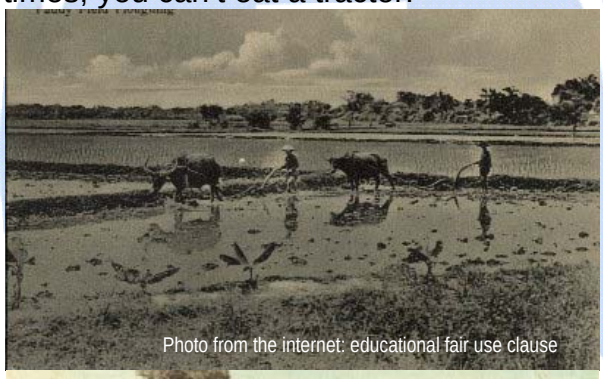
For the long run, the RTC-TH is advocates rainwater harvesting and storage (in our fish ponds, water tanks, and soil). Mulching, composting, and increasing earthworm populations (and healthy soil in general) help to increase soil structure and soil moisture retention. We are directing more of our effort into soil development. Improved soil moisture retention directly benefits our crops. We see this as a critical factor in our preparing for drought.

The fortunate geography of our farm (being located downslope from a protected government forest area) makes protecting the forest and the watershed our key concern. Forest encroachment by farmers seeking more land to cultivate, climate change create more favorable conditions for wildfires, accidental fires set by hunting parties are some of the many factors threatening forests in many Thai watersheds. More attention is needed for watershed protection and monitoring.

Thailand: Then & Now

Some parts of rural Thailand seem to have one foot in the past, and one foot in the modern world. The people's heads are caught in transition.

We found some old photo postcards on the internet taken about the 1930s or so. We tried to pair them up with similar photos we took around the Ban Na Fa and A. Thawangpha area. Rice is a commonly grown crop from back then and is still a major crop today. While the technology may have changed, growing rice is still the hard work it always has been. The basic components: land, water, seeds, labor haven't changed. The technology shifted from animal power to mechanical and natural organics (e.g. organic manures and compost) to synthetic chemicals (e.g. fertilizers, herbicides, and pesticides). The main beast of burden used to be the water buffalo. To a large extent it has been replaced by the "iron buffalo" (a small walk-behind tractor). The costs of ownership and operation are higher. But farmers hope to offset those costs with planting more and hoping to earn more. However, in hard times, you can't eat a tractor.



Farmlands close to urban centers are under pressure to sell out to developers. Many times this is prime agricultural land. Once sold and urbanized, farmers either get out of farming or move to areas to 1) clear forested land for farming; 2) move to available land which is usually less productive; 3) become landless tenant farmers.

At the same time, the younger generation grows up and many tend to have little desire to stay in farming areas. They gravitate to the cities and factory jobs to earn more money. Only later do many realize the loss in quality of life they may have had on the farm.